Coastal Advisory Committee
Meeting Minutes

Town of Marshfield, Massachusetts

Hearing Room 3 — Marshfield Town Hall
2013 September 26

COMMITTEE PRESENT:

- Elizabeth Mulroy (Chair)
- Ben Cowie-Haskell (Vice Chair)
- Thomas Fleming
- Sean Robinson (Clerk)
- Reed Stewart

ALSO PRESENT (in audience):

- A reporter from WATD

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1. Call to order

   Ms. Mulroy called the meeting to order at 7:06 pm.

2. Approval of Clerk's Minutes

   Ms. Mulroy called for objections or corrections to the minutes of the 2013 August 29 meeting of the Committee. Mr. Stewart noted minor corrections to the spellings of names. The Committee voted to accept the revised minutes 5–0. Mr. Robinson will submit the approved corrected minutes to the Town Clerk.

3. Discussion of Work Plan

   (a) Education and Outreach

      i. Letter to School Superintendent
      Mr. Stewart has drafted a letter to Superintendent of Schools, Dr. Scott Borstel, offering the Committee's assistance in educational efforts within the Marshfield schools on topics relevant to the Committee's mission. The text of the draft is included on page 7 below. The concept of the letter was well received by the

Committee. Mr. Cowie-Haskell indicated that he would like the offer in the letter to be more concrete, specifically with an offer to speak to teachers during their professional development periods. Committee members indicated that climate change and sea level rise could lead to lesson plans not just in science, but also in other curricular areas — such as local geography, history, and critical thinking skills — which could be applied at many grade levels. (The book *One Look at Marshfield's Geography* by Reed Stewart was noted as a useful geography primer.)

Mr. Robinson motioned that Mr. Stewart send the letter, updated with Mr. Cowie-Haskell's suggestion of including teacher development, from himself on behalf of the Committee, to Dr. Borstel. Mr. Stewart seconded the motion. The motion passed 5–0.

Mr. Flemming and Mr. Robinson indicated that in parallel with Mr. Stewart's letter to School leadership, they will make an effort to contact teachers in the Marshfield school system with whom they are acquainted to gauge what types of materials and engagement they would find most useful.

ii. Bibliography of Research and Case Studies

Ms. Mulroy indicated that withing her field of study, the annotated bibliography is an especially useful tool for collecting and collating information across a field, and that this format would be very useful for the Committee to both organize its own learning on coastal adaptation and to share this learning with the Town. (Several examples of the information the Committee is amassing were given, including, for example, the documents under discussion at the present and prior meetings; materials from the office of Mr. Halkiotis; recent news articles; and a few feet of bookshelf in the Ventress Library history room collected by Mr. Stewart on a prior project.)

In discussion, the Committee members indicated general agreement with this idea, but this raised the question of what the most useful format would be for such a bibliography. After some discussion, Mr. Robinson indicated that he could create and host a wiki website, easily editable by the Committee members but otherwise secure, which is an ideal format for an annotated bibliography which could grow overtime.

Mr. Cowie-Haskell moved that the Committee create an annotated bibliography in the form of wiki and that it be made available to the community via a link from the Committee's official Town website. Mr. Stewart seconded. The Committee voted 5–0 in favor.

A suggestion was made by Mr. Stewart that a press release could be made once the bibliography is complete, informing the Town

of its existence.

On the subject of useful materials, Ms. Mulroy indicated that the Committee members should read *Preparing for a Rising Tide*, a recently released report of the Boston Harbor Association.

iii. Discussion of NOAA Webinar 2013 September 25

Mr. Cowie-Haskell had previously brought to the attention of the Committee a 2013 September 25 webinar on planning and coastal adaptation, presented by NOAA officials and titled *What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure*. Mr. Cowie-Haskell, Mr. Robinson, and Mr. Flemming were not able to watch the webinar, but Ms. Mulroy did see it and Mr. Stewart saw most of it. A hard copy summary of the webinar, available at http://www.csc.noaa.gov/digitalcoast/publications/adaptation and included as an attachment on page 8 below, was reviewed by the Committee.

Mr. Stewart's summary of his first impressions of the webinar was that while he did not learn a lot of new material, the clear take away message was that the adaptation process will be expensive and that understanding those costs will require "a good engineer and a good economist"; but this again is not necessarily new information for the Committee. Ms. Mulroy summarized the webinar as providing a framework for informed decisions about climate adaptation. She indicated that the framework is well summarized by following the bullet points in the summary document (again, included below on page 8).

The below are a few additional summary points of the NOAA framework indicated by the Committee members following from the webinar itself and their reading of the summary document:

- *Make sure* you can quantify your costs and benefits.
- The choice of "priority items versus holistic approach" and gradations of priorities must be made early in the planning process. For example, in a priority scheme, hospitals and waste treatment may be placed above homes and business, whereas a holistic scheme attempts to save everything. There is so much to plan that triaging may be important.
- Do a retrospective analysis before prospective planning. Part of this early planning involves establishing a high water mark.
- Determine what will happen if no adaptation measures are undertaken (a baseline scenario).
- Asses the complexity of the problem. Complexity is a theme in this framework, with public health, economic impacts, environmental impacts, *etc.*, all interacting.
- Physically, the higher flooding risk due to increased storm activity in climate change scenarios is not just that sea level rise leads to more aggressive storm surge on the coastline,

but also that more storms will be dropping higher volumes of precipitation inland.

- This planning framework can be used to establish as much information as possible before an emergency event so as to limit the mistakes during the event, but is not not necessarily a framework to be used during an emergency response itself.
- To apply this framework to Marshfield's needs, the Committee would need to streamline it.

Mr. Cowie-Haskell indicated that the top line of the diagram on page `ES-2` of the summary document is essentially the Committee's work plan. He indicated the the Committee is currently in the "Understand Your Baseline Risks" phase, but will have to move on to "Asses what you can do differently", followed by "Calculate cost and benefits" to within the limits of the Committee's economic expertise, and then "Make a Decision" in the form of recommendations to the Selectmen. In the diagram, these four major work area headings are denoted with the colors *purple*, *blue*, *green*, and *orange*, respectively.

Mr. Cowie-Haskell then led an exercise in which the Committee walked through the 14 items in its mission statement (see the document attached to the minutes of the 2013Jul25–Aug1 meeting of the Committee) and mapped them into the four colored headings of the NOAA framework. The Committee's findings on this working exercise were as follows (using the item numbers from the mission statement and the above mentioned colors for the NOAA framework headings):

Item 1. primarily purple, but really everything
Item 2. blue
Item 3. orange
Item 4. green
Item 5. green
Item 6. blue, slightly purple
Item 7. purple, then orange
Item 8. supporting point to purple and green
Item 9. purple, then orange
Item 10. purple, then orange
Item 11. procedural item in all colors
Item 12. procedural item in all colors
Item 13. procedural item in all colors
Item 14. orange, but could happen at all stages.

Mr. Cowie-Haskell indicated that he will refine this mapping further and come back at the next meeting with the NOAA framework adapted specifically for the Committee's work.

Mr. Cowie-Haskell then indicated that public education is part of the blue category, so he proposed a public forum, perhaps

jointly sponsored with the Energy and Waterways Committees and other bodies. Ms. Mulroy suggested inviting our regional colleagues from Scituate and Duxbury.

Mr. Cowie-Haskell moved that the Committee shall organize a public forum on climate change and its effects on coastal resources in collaboration with other Town committees, at a time to be decided. Mr. Flemming seconded. The Committee voted 5–0 in favor.

Mr. Cowie-Haskell indicated that he will bring a more detailed outline for the forum to the next meeting, after to talking to Gia Lane of the Energy Committee and Paul Halkiotis. Further, Ms. Mulroy indicated that she will consult with the Waterways Committee.

(b) Collaboration with Town and Regional Committees

Ms. Mulroy introduced a draft of a "waterways management plan" from the Waterways Committee for review by the Committee. This draft includes integration with the Town's master plan and discussion of sea level rise adaptation. The Coastal Advisory Committee has been flagged as a partner at several points in the draft. The Waterways Committee has requested the Coastal Advisory Committee's feedback on the draft before it is discussed at their Weds, 2013 October 2 meeting. After some brief general discussion in which the work of the Waterways Committee was positively received, Ms. Mulroy indicated that she will collect the individual opinions of the Committee members by email and then report to Waterways Committee at their meeting.

4. Preliminary Discussion of Kleinfelder Report

The Committee members are now all in possession of a copy of the full version of the Kleinfelder report. The Committee members all agreed to study this report for discussion at a later meeting. It was suggested that Mr. Halkiotis be invited to the next meeting for an in-depth discussion.

No motions or votes on this agenda item.

5. Other Business

Ms. Mulroy informed the Committee of an upcoming conference on sea level rise in October which may be of interest.

Mr. Stewart informed the Committee of a recent article in the *Marshfield Mariner* on coastal infrastructure and erosion in Massachusetts which he found to be quite good, as well as a recent article in *Atlantic Cities*.

Mr. Cowie-Haskell asked whether the Committee is "missing the boat" on the Town's master planning process. Ms. Mulroy indicated that she had recently discussed this issue with Mr. Halkiotis and that he is unconcerned about this point. Ms. Mulroy will invite Mr. Halkiotis to the Committee's next meeting to discuss the master plan.

No motions or votes on this agenda item.

6. Citizen participation

   Citizens were thanked for their presence. No further discussion was raised beyond the above agenda items. The reporter from WATD indicated that he would have questions for individual Committee members after the meeting.

7. Adjourn

   Mr. Stewart moved to adjourn the meeting. Mr. Cowie-Haskell seconded. No further discussion. The Committee voted 5–0 in favor.

   The meeting adjourned at 9:03 pm.

Respectfully submitted,

Sean Robinson
Coastal Advisory Committee Clerk

Draft text of letter presented by Mr. Stewart to the Committee, as discussed in agenda item 3(a)i above.

Reed F. Stewart,
P.O. Box 413, Marshfield Hills,
Massachusetts, 02051

September 10, 2013

Dr. Scott L. Borstel
Superintendent of Schools
76 South River Street
Marshfield, Massachusetts

Dear Dr. Borstel:

As a member of the towns Coastal Advisory Committee I write to ask how we may assist the school department as it prepares youngsters to understand the seriousness of sea level rise. The world faces very serious problems in the coming years and our local region will be hard pressed to cope. The future voters and residents of Marshfield can better take part in meeting those challenges, of course, the more they understand the natural science and the political environment of the circumstances of the area.

Are there ways in which your teachers are bringing their students to that understanding? Can we suggest resources? How can we help? You may well be aware of some of the extra-curricular resources, but just in case they havent come to your attention, there are several programs available on the local cable channels which present the problem. There is also the beginnings of a reference section in the Ventress Library.

The CAC is a completely voluntary, appointed committee with no funding from the town, reporting directly to the selectmen We cannot offer any material resources to your department, but perhaps we may share our expertise with the teachers, as one way of assisting.

The only reasons for this letter are to stress the extreme importance to the students of the progressive sea level rise and to urge the school department to help educate them about that challenge. Please let us assist you in the work.

Cordially,

Reed F. Stewart, Ph.D.
Professor emeritus, anthropology and geography,
Bridgewater State University

Executive Summary

What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure

June 2013

Eastern Research Group, Inc.

Written under contract for the
National Oceanic and Atmospheric Administration (NOAA)
Coastal Services Center

NOAA Coastal Services Center
(843) 740-1200
www.csc.noaa.gov

NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

The Importance of Making Economically Informed Decisions

Introduction

Sea level rise (SLR) poses a serious threat to coastal communities. Global sea level has been rising over the past several decades and is expected to continue to rise in the decades to come. With coastal communities increasingly vulnerable to coastal hazards, community leaders need to consider future SLR in their decision-making.

The purpose of *What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure* is to help decision-makers in the local, state, or federal government make informed economic decisions about adapting to coastal flooding from SLR and high-water-level events such as storm surge or astronomical high tides. The detailed guide provides a step-by-step methodology that communities can pursue, describing a scenario-based approach to develop the full range of costs and benefits of various adaptation strategies. This framework is intended to help community leaders answer questions such as:

- How will SLR and storm surge affect my community?
- What is the cost of doing nothing?
- What can we do to adapt?
- How can I begin to determine the best adaptation strategy for my community?
- How much will it cost to keep my community safe?

Using this framework to make economically informed decisions can help achieve safer, more resilient, and fiscally sound communities. In the long run, the entire community benefits by investing in adaptation efforts: after a flood event, utilities will be restored quicker, stores and banks will be open earlier, children will return to school sooner, and employees will be back at work with minimal disruption. Up-front investments can help ensure a successful future. By accounting for the significant costs of a disaster and associated risks, leaders can make strategic choices about where, when, and how to make investments in adaptation responses to maximize benefits and minimize risk.

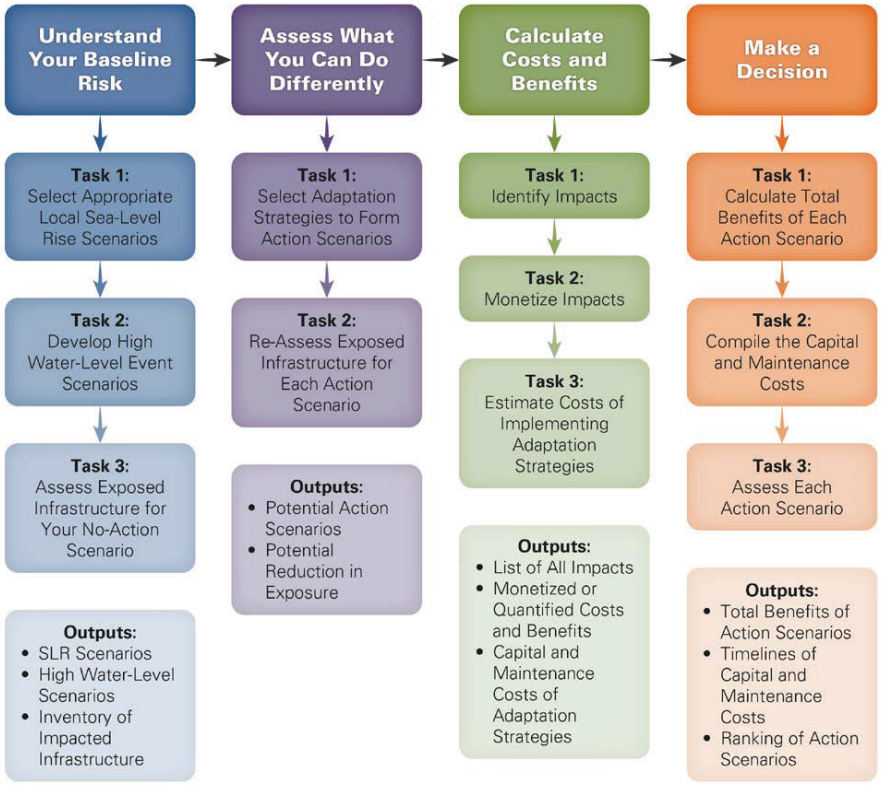
Role for Community Leaders

This executive summary is intended to help community leaders gain a better understanding of the process and resources needed to employ the economic framework in *What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure*. The executive summary provides a general overview of the process and the expertise needed to complete the process.

This framework, illustrated in Figure 1, is highly adaptable and can help any community make decisions about investing in adaptation strategies. Communities can use it to assess the impact of inundation on their entire infrastructure, which is referred to as the holistic approach. Alternatively, if a community

wants to focus on select infrastructure, such as a hospital or wastewater treatment plant, the framework allows for this priority infrastructure approach.

Figure 1: Framework for Making Informed Decisions



Although the framework is accessible to a general audience, several steps require specialized expertise or training to implement. In order to successfully employ this framework, it is necessary to assemble a team that includes many types of experts.

What Types of Experts Are Typically Needed?

- **GIS analysts** to help your team use spatial data.
- **Inundation modeling experts** to help predict flooding impacts.
- **Engineers** to help you estimate the capital and maintenance costs of resilient infrastructure.
- **Economists** to help you monetize the costs and benefits, determine a discount rate, and interpret your results.
- **Planners** and **Land-Use Attorneys** to select and assess the feasibility of implementing adaptation strategies.

Community leaders are also encouraged to use this framework to guide the gathering of relevant information when beginning the adaptation planning process. If you do not have the needed expertise in-house for some of the analyses, this framework can help you craft an effective solicitation for proposals to get the necessary consultant support.

Understand Your Baseline Risk

The first stage in our framework is intended to help you understand what's at stake if your community does nothing to mitigate the effects of coastal hazards and rising sea levels. Costs, risks, and vulnerability influence every community's coastal hazard policies, but comparing the cost of inaction to the benefits of taking action is how a community can feel confident that it is making a fiscally and socially responsible decision when implementing an adaptation strategy. Using this process-based approach for defining risk and vulnerability will help arm your community to make decisions about what infrastructure really matters with respect to coastal hazards.

Future SLR will have a compounding effect on coastal flooding events and must be considered when determining baseline risk. Global SLR has been a consistent observable trend for decades and is expected to continue for the foreseeable

Key Tasks:

- ***Select appropriate SLR scenarios:*** Use existing data to select appropriate local sea level scenarios.
- ***Develop high-water-level event scenarios and integrate them with SLR projections:*** Review historical data to select a range of high-water-level events such as storm surge or astronomical high tides, and integrate these data with SLR scenarios to select the water-level event heights that you would like to use as the basis for assessing damage from flooding.
- ***Assess exposed infrastructure in a no-action scenario:*** Integrate the selected SLR scenarios and high-water-level events to develop coastal flooding scenarios and identify at-risk infrastructure for each scenario.

future. If your community establishes its baseline risk without factoring in SLR, you could be significantly underestimating your vulnerability to coastal hazards in the future. Consider that because of SLR, today's occasional coastal floods will become regular events. In this stage, your team will develop high-water scenarios for major and minor storm events.

Your team will also develop:

- SLR scenarios to select appropriate water-level height increases to use as the basis for assessing damage from flooding.
- An inventory of impacted infrastructure, built structures, and other priority assets to assess your community's exposure to coastal flooding.

Local decision-makers cannot completely observe a community's vulnerability without performing formal assessments, either as stand-alone projects or as part of this guide's overall framework. NOAA and other organizations have developed guidance and tools specific to vulnerability assessments that help communities complete this step.

Assess What You Can Do Differently

Once your community understands the severity of the risk it currently faces from coastal hazards, the next stage is for your team to explore what actions your community can take to mitigate these risks. These action scenarios can be assessed to determine how they would alter the severity of impacts on your community for the high-water-level event scenarios developed in the previous stage.

Key Tasks:

- ***Select flooding adaptation strategies to form action scenarios:*** Develop one or more action scenarios that each includes one or more flooding adaptation strategies.
- ***Re-assess your exposed infrastructure for your action scenarios:*** For each action scenario, identify your at-risk infrastructure and land area.

In this stage, your team will develop action scenarios specific to your community, each employing one or more flooding adaptation strategies. For each action scenario you develop, you will assess the change to the impacts on your community or priority infrastructure for each given water-level increase.

Your community should consider several different action scenarios with a range of adaptation strategies and resource intensities in order to identify the best a course of action for your community. Some communities may find that a combination of less expensive adaptation strategies can provide the most cost effective approach, while others will determine that a single more expensive capital investment is clearly the way to go.

Calculate Costs and Benefits

The next stage will help your team monetize—or assign a dollar value for the purpose of financial analysis—the impacts of coastal flooding on your community. However, before your team can monetize the impacts, they will need to identify and fully understand the severity of potential impacts. Impacts are typically categorized as primary such as direct infrastructure damage, secondary such as business interruption, and environmental such as beach damage. Communities are complex systems and any impact, natural or human, can create a ripple of desirable or undesirable consequences.

Key Tasks:

- ***Identify impacts:*** Recognize and categorize the potential impacts of coastal inundation on your community and the impacts from implementing resilient infrastructure options.
- ***Monetize costs and benefits:*** Select tools, models, and other techniques to monetize costs and benefits of the impacts based on available resources.
- ***Estimate capital and maintenance costs of implementing resilient infrastructure:*** Estimate the costs associated with implementing resilient infrastructure.

Traditional analyses of the impacts resulting from coastal flooding focus on primary impacts—usually the costs associated with structural damage and loss of life—but sometimes fail to identify secondary and environmental impacts. The failure to account for impacts beyond primary ones can underestimate the true cost or benefit and lead to poor decision-making.

In this stage, your team will monetize impacts resulting from taking action by implementing adaptation strategies. The monetized values of the impacts of implementing adaptation strategies can be positive or negative, adding to or subtracting from the net benefit of each action. The detailed guide describes some comprehensive tools, databases, methodologies, and general approaches for monetizing the impacts. The resources necessary to monetize every impact, in many cases, can be overwhelming; thus, it will be very important for your team to focus its resources on the most substantial impacts and to remember to consider any non-monetized impacts qualitatively as you assess each action scenario.

Your team will also develop:

- Lists of all potential impacts of coastal flooding on your community and the impacts from implementing resilient infrastructure options.
- Estimates of all capital and maintenance costs of implementing the adaptation strategies.

Make a Decision

The final stage of this framework will help you decide whether it makes financial sense—the benefits outweigh your costs—to pursue an action scenario. If your team prepared multiple action scenarios, it is possible that more than one of them makes financial sense.

To make a truly informed decision, you will need to consider the qualitative impacts in each action scenario. In some cases, the monetized results speak loudly. In other cases, a decision based on the monetized impacts alone will be less conclusive and considering the qualitative impacts could lead you to the best decision for your community.

Key Tasks:

- ***Calculate total benefits of each action scenario:*** Calculate the total benefits of each action scenario for each high-water-level event using impact costs and other costs and benefits monetized earlier.
- ***Calculate the total net present value of capital and maintenance costs for each action scenario***
- ***Assess each action scenario:*** Determine which action scenarios, if any, have total benefits that exceed total costs. Rank those that do based on the cost-benefit results, financial feasibility, and any other factors you want to consider.

If you prepared multiple action scenarios, more than one of them might make financial sense; in that case, you will want to find the best option for your community based on the cost-benefit results, financial feasibility, and other relevant considerations.

Your team will also develop:

- Timelines of capital and maintenance costs.
- Rankings of the action scenarios.

Even after your analysis produces its results, various considerations and external barriers can sometimes make even informed decisions quite difficult. One common consideration is how much the benefit outweighs the cost for each action scenario—knowing whether you receive $10, $4, or $1.10 in benefits for every $1 spent on implementation is critical to your decision. You will also need to consider whether it is feasible to raise the necessary funding to implement a chosen adaptation strategy. Required funding typically includes the initial capital as well as funding for maintenance through the years, which is too often overlooked.

It's also helpful to identify any obstacles beyond the economic costs and benefits such as social feasibility, community culture, and administrative and legal aspects, which might hinder or prevent implementation. Finally, you might also want your team to discuss the question of who pays for implementing adaptation projects and who benefits from them when determining the best solution for your community.